							REC	ALIBRATION
						2	D	UE DATE:
							Janua	ary 24, 201
	Ce	rtife	cate of	A	Cal	ibra	ntion	
			Calibration (Certificatio	on Informat	ion		
Cal. Date:	January 24	, 2018	Rootsn	neter S/N:	438320	Ta:	293	°К
Operator:	Jim Tisch					Pa:	756.9	mm Hg
Calibration	Model #:	TE-5025A	Calib	rator S/N:	3166	1995-94		9
		Vol. Init	Vol. Final	AVol.	ATime	AP	AH	1
	Run	(m3)	(m3)	(m3)	(min)	(mm Hg)	(in H2O)	
	1	1	2	1	1.4430	3.2	2 00	
	2	3	4	1	1.0270	6.4	4.00	
	3	5	6	1	0.9220	7.9	5.00	
	4	7	8	1	0.8780	8.7	5.50	
	5	9	10	1	0.7270	12.6	8.00	
			D	ata Tabula	tion			ĺ
	Vstd	Qstd	√∆H(<u>Pa</u> Pstd)(<u>Tstd</u>)		Qa	√∆H(Ta/Pa)	
	(m3)	(x-axis)	(y-axi	s)	Va	(x-axis)	(v-axis)	
	1.0087	0.6990	1.423	3	0.9958	0.6901	0.8799	
	1.0044	0.9780	2.012	9	0.9915	0.9655	1.2443	
	1.0024	1.0872	2.250	5	0.9896	1.0733	1.3912	
	1.0013	1.1404	2.360	3	0.9885	1.1259	1.4591	
	0.9961	1.3701	2.846	7	0.9834	1.3526	1.7598	
	OCTO	m=	2.122	31	~	m=	1.32895	
	USID	D=	-0.060	16	QA	b=	-0.03719	
			0.999	99		r=	0.99999	
	Vetdal		10 at dil Tat d FT.	Calculation	1S		1.10.1	
	Ostd=	Vetd/ATime	/Pstu)(Tstu/Ta	,	Va=	ΔVOI((Pa-ΔP)/Pa)	
	- quid-j	v stu/ Arnine	For subseque	ent flow rat	e calculation	va/Anme		
	Qstd=	1/m ((\[\[\[\[\[\[\[\[\[\[\[\[\[Pa (Tstd Pstd (Ta))-b)	Qa=	1/m ((√∆H	(Ta/Pa))-b)	
	Standard	Conditions	1	<u> </u>		<u></u>	1 /	
		and the second se		Г		RECAL	IBRATION	
Tstd:	298.15	°K						
Tstd: Pstd:	298.15 760	°K mm Hg		t				000000000000000000000000000000000000000
Tstd: Pstd:	298.15 760 K	°K mm Hg ley			US EPA reco	mmends an	nual recalibratio	n per 1998
Tstd: Pstd: ΔH: calibrate	298.15 760 K or manomet	°K mm Hg ey er reading (ii	n H2O)		US EPA reco 40 Code o	mmends an of Federal R	nual recalibratio egulations Part 5	n per 1998 50 to 51,
Tstd: Pstd: ΔH: calibrate ΔP: rootsme Ta: actual at	298.15 760 r K or manomet ter manome	°K mm Hg er reading (in eter reading (perature (°K)	n H2O) mm Hg)		US EPA reco 40 Code o Appendix B	mmends an of Federal R to Part 50,	nual recalibratio egulations Part 5 Reference Meth	n per 1998 50 to 51, od for the
Tstd: Pstd: ΔH: calibrate ΔP: rootsme Ta: actual at Pa: actual ba	298.15 760 K or manomet ster manome psolute temp arometric pr	°K mm Hg er reading (ii eter reading berature (°K) essure (mm	n H2O) mm Hg) Hg)		US EPA reco 40 Code o Appendix B Determinat	mmends an of Federal R to Part 50, ion of Suspe	nual recalibratio egulations Part 5 Reference Meth inded Particulate	n per 1998 50 to 51, od for the Matter in
Tstd: Pstd: ΔH: calibrate ΔP: rootsme Ta: actual at Pa: actual ba b: intercept	298.15 760 K or manomet ter manome psolute temp arometric pr	°K mm Hg er reading (in eter reading (berature (°K) essure (mm	n H2O) mm Hg) Hg)		US EPA reco 40 Code o Appendix B Determinati the	mmends an of Federal R to Part 50, on of Suspe Atmospher	nual recalibratio egulations Part 5 Reference Meth ended Particulate re, 9.2.17, page 3	on per 1998 50 to 51, od for the Matter in 80
Tstd: Pstd: ΔH: calibrate ΔP: rootsme Ta: actual al Pa: actual bi b: intercept m: slope	298.15 760 K or manomet ter manome psolute temp arometric pr	°K mm Hg er reading (ii eter reading (berature (°K) essure (mm	n H2O) mm Hg) Hg)		US EPA reco 40 Code o Appendix B Determinati the	mmends an of Federal R to Part 50, on of Suspe Atmosphe	nual recalibratio egulations Part 5 Reference Meth ended Particulate re, 9.2.17, page 3	on per 1998 50 to 51, od for the Matter in 30

Tisch Environmental, Inc. 145 South Miami Avenue

Village of Cleves, OH 45002

www.tisch-env.com TOLL FREE: (877)263-7610 FAX: (513)467-9009



Location	:	CMA1b	Calibration Date	:	03-May-18
Equipment no.	:	HVS001	Calibration Due Date	:	03-Jul-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition								
Temperature, T _a		300		Kelvin	Pressure, P _a	1	10)14 mmHg
Orifice Transfer Standard Information								
Equipment No.		Ori002		Slope, m _c	2.122	31	Intercept, bc	-0.06016
Last Calibration Date		19-Jan-18	8		(H	x P _a / 1	013.3 x 298 / T	a) ^{1/2}
Next Calibration Date		19-Jan-1	9			m _c	$x Q_{std} + b_{c}$	
Calibration of TSP								
Calibration	Mar	nometer Re	eading	Q _{std}		Cont	inuous Flow	IC
Point	н ((inches of v	water)	(m ³ / min.)		Re	corder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)
	(up)	(down)	(difference)	X-#	axis		(CFM)	Y-axis
1	1.5	1.5	3.0	0.8	3420		24	23.9281
2	2.4	2.4	4.8	1.0)576		32	31.9042
3	3.8	3.8	7.6	1.3	3234		40	39.8802
4	4.9	4.9	9.8	1.4	1990		46	45.8622
5	6.1	6.1	12.2	1.6	692		52	51.8443
By Linear Regression of Y c	on X							
	Slope, m	=	33.2	2506		tercept, b =	= -3.8	3183
Correlation C	oefficient*	=	0.9)995	_			
Calibration	Accepted	=	Yes	/ No **	_			

 * if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been

re-assigned from EL452 to HVS001 with respect to the update in quality management system.									
Calibrated by	:	Jackey MA	Checked by		Pauline Wong				
Date	:	03-May-18	Date		03-May-18				



Location	:	CMA2a	Calibration Date	:	03-May-18
Equipment no.	:	HVS002	Calibration Due Date	:	03-Jul-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition									
Temperature, T _a		300		Kelvin Pressure, P _a				014 mmHg	
Orifice Transfer Standard Information									
Equipment No.		Ori002		Slope, m _c	2.122	31	Intercept, bc	-0.06016	
Last Calibration Date		19-Jan-18	8		(H	x P _a / 10	13.3 x 298 / 1	$(\Gamma_{a})^{1/2}$	
Next Calibration Date		19-Jan-1	9			m _c :	x Q _{std} + b _c		
Calibration of TSP									
Calibration	Manometer Reading			Q	std	Contir	nuous Flow	IC	
Point	н (inches of v	water)	(m ³ / min.)		Rec	order, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)	
	(up)	(down)	(difference)	X-axis			(CFM)	Y-axis	
1	1.6	1.6	3.2	0.8	687		25	24.9251	
2	2.5	2.5	5.0	1.0	788		32	31.9042	
3	4.0	4.0	8.0	1.3	571		43	42.8712	
4	5.1	5.1	10.2	1.5	287		50	49.8503	
5	6.5	6.5	13.0	1.7	221		56	55.8323	
By Linear Regression of Y o	n X								
Slope, m = 37.		37.0	0288	In	tercept, b =	-7.4	4710		
Correlation C	oefficient*	=	0.9	9991					
Calibration	Accepted	=	Yes	/ No **	_				

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been

re-assigned from EL449 to HVS002 with respect to the update in quality management system.									
Calibrated by	:	Jackey MA	Checked by		Pualine Wong				
Date	:	03-May-18	Date :		03-May-18				



Location Equipment no. CMA3a HVS012

Calibration	Date	:	
Calibration	Due Date	:	_

9.3566

Intercept, b =

04-May-18 04-Jul-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition									
Temperature, T _a		297		Kelvin	Pressure, P _a			l016 mmHg	
Orifice Transfer Standard Information									
Equipment No.		Ori002		Slope, m _c	2.1223	31	Intercept, bc	-0.06016	
Last Calibration Date		19-Jan-18	8		(H x	P _a / 10)13.3 x 298 /	T _a) ^{1/2}	
Next Calibration Date		19-Jan-1	9			m _c	x Q _{std} + b _c		
Calibration of TSP									
Calibration	Manometer Reading			Q	std	Conti	nuous Flow	IC	
Point	н	(inches of v	water)	(m ³ /	′ min.)	Re	corder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.3	31)
	(up)	(down)	(difference)	X-a	axis		(CFM)	Y-axis	
1	1.3	1.3	2.6	0.7	'904		32	32.0965	
2	2.2	2.2	4.4	1.0)197		38	38.1146	
3	3.5	3.5	7.0	1.2	2787		46	46.1387	
4	4.6	4.6	9.2	1.4	618		50	50.1508	
5	5.7	5.7	11.4	1.6	6240		56	56.1689	

By Linear Regression of Y on X

Correlation Coefficient*

Calibration Accepted

* if Correlation Coefficient < 0.990, check and recalibration again.

Slope, m

=

=

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been

28.4850

0.9982

Yes/No**

re-assigned from EL333 to HVS012 with respect to the update in quality management system.

Calibrated by	:	Jackey MA	Checked by	Pauline Wong
Date	:	04-May-18	Date :	04-May-18



Location Equipment no. CMA4a HVS004 Calibration Date Calibration Due Date 04-May-18 04-Jul-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition									
Temperature, T _a	297	Kelvin Pressure, P _a 1016 mm			6 mmHg				
Orifice Transfer Standard Information									
Equipment No.	Ori002	Slope, m _c	2.12231	Intercept, bc	-0.06016				
Last Calibration Date	19-Jan-18	(H x P _a / 1013.3 x 298 / T _a) ^{1/2}							
Next Calibration Date	19-Jan-19	$m_{c} x Q_{std} + b_{c}$							

Calibration of TSP								
Calibration	Manometer Reading		Q _{std}	Continuous Flow	IC			
Point	H (inches of water)		(m ³ / min.)	Recorder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)			
	(up)	(down)	(difference)	X-axis	(CFM)	Y-axis		
1	1.5	1.5	3.0	0.8469	24	24.0724		
2	2.3	2.3	4.6	1.0420	34	34.1025		
3	3.7	3.7	7.4	1.3140	44	44.1327		
4	4.9	4.9	9.8	1.5078	50	50.1508		
5	6.2	6.2	12.4	1.6926	56	56.1689		
By Linear Regression of Y	on X							
	Slope, m	=	37.:	2631 In	itercept, b = -5.9	9956		
Correlation C	Correlation Coefficient* =		0.9)954				
Calibration	Calibration Accepted =		Yes	/ No **				

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Domorko	
Remarks	•

As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been

 re-assigned from EL390 to HVS004 with respect to the update in quality management system.

 Calibrated by
 :
 Jackey MA
 Checked by
 :
 Pauline Wong

 Date
 :
 04-May-18
 Date
 :
 04-May-18

Date



Location Equipment no. CMA5b HVS010

Calibration Date	
Calibration Due Date	

04-May-18 04-Jul-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition									
Temperature, T _a		297		Kelvin	Pressure, P _a		10)16 mmHg	
						-			_
	1		Orifice	Transfer Sta	ndard Informa	ation			
Equipment No.		Ori002		Slope, m _c	2.1223	31	Intercept, bc	-0.06016	
Last Calibration Date		19-Jan-1	8		(H	x P _a / 10	13.3 x 298 / T	a) ^{1/2}	
Next Calibration Date		19-Jan-1	9		=	m _c >	αQ _{std} +b _c		
				Calibratio	n of TSP				
Calibration	Ма	nometer R	eading	Q	std	Contin	uous Flow	IC	
Point	н	(inches of v	water)	(m ³ /	min.)	Rec	order, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.3 ⁻	1)
	(up)	(down)	(difference)	X-a	ixis	(CFM)	Y-axis	
1	1.5	1.5	3.0	0.8	469		30	30.0905	
2	2.3	2.3	4.6	1.0	420		38	38.1146	
3	3.9	3.9	7.8	1.3	483		46	46.1387	
4	5.0	5.0	10.0	1.5	229		52	52.1568	
5	6.4	6.4	12.8	1.7	192		56	56.1689	
By Linear Regression of Y o	on X								
	Slope, m	=	29.7	7383	Int	ercept, b =	5.9	977	
Correlation C	oefficient*	=	0.9	953					
Calibration	Accepted	=	Yes	/ No **					

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been

re-assigned from EL222 to HVS010 with respect to the update in quality management system.

Calibrated by Date Jackey MA 04-May-18 Checked by Date Pauline Wong 04-May-18



Location Equipment no.

MA1e HVS007 **Calibration Date** Calibration Due Date

04-May-18 04-Jul-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

	Ambient Condition						
Temperature, T _a		297		Kelvin Pressure,	Pa	10)16 mmHg
Equipment No.		Ori002	Orifice Tra	Slope, m. 2 12	231	Intercept bc	-0.06016
							- \ 1/2
Last Calibration Date	L	19-Jan-18	3	(H)	хР _а / 101	3.3 x 298 / 1	a) "2
Next Calibration Date		19-Jan-1	9		m _c x	Q _{std} + b _c	
Calibration of TSP							
Calibration	Mar	nometer Re	eading	Q _{std}	Continu	ious Flow	IC
Point	н ((inches of v	water)	(m ³ / min.)	Reco	rder, W	$(W(P_a/1013.3x298/T_a)^{1/2}/35.31)$
	(up)	(down)	(difference)	X-axis	(C	FM)	Y-axis
1	1.5	1.5	3.0	0.8469	:	26	26.0784
2	2.4	2.4	4.8	1.0638	:	34	34.1025
3	3.7	3.7	7.4	1.3140		44	44.1327
4	4.9	4.9	9.8	1.5078	:	50	50.1508
5	6.2	6.2	12.4	1.6926		58	58.1749
By Linear Regression of Y	on X						
	Slope, m	=	37.58	826 In	tercept, b =	-5.7	7663
Correlation C	oefficient*	=	0.99	993			

Correlation Coefficient*

Calibration Accepted

* if Correlation Coefficient < 0.990, check and recalibration again.

As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been Remarks : re-assigned from EL455 to HVS007 with respect to the update in quality management system.

Yes/No**

Calibrated by Date

Jackey MA 04-May-18 Checked by Date

Pauline Wong 04-May-18



Location Equipment no. MA1w HVS008 Calibration Date Calibration Due Date

04-May-18 04-Jul-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition						
Temperature, T _a	297	Kelvin Pressure, P a			1016 mmHg	
	Orifice Tra	ansfer Standard Informa	tion			
Equipment No.	Ori002	Slope, m _c 2.122	31 I	ntercept, bc	-0.06016	
Last Calibration Date	19-Jan-18	(H x P _a / 1013.3 x 298 / T _a) ^{1/2}				
Next Calibration Date	19-Jan-19	$= m_{c} \times Q_{std} + b_{c}$				
Calibration of TSP						
Calibration	Manometer Reading	Q _{std}	Continuo	us Flow	IC	
Point	H (inches of water)	(m ³ / min.)	Record	ler, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)	

	(up)	(down)	(difference)	X-axis	(CFM)	Y-axis
1	1.5	1.5	3.0	0.8469	20	20.0603
2	2.4	2.4	4.8	1.0638	28	28.0844
3	3.7	3.7	7.4	1.3140	36	36.1086
4	4.8	4.8	9.6	1.4927	42	42.1267
5	6.2	6.2	12.4	1.6926	50	50.1508
By Linear Regression of Y	on X					
	Slope, m		34.96	679 In	tercept, b =	9.5219
Correlation C	oefficient*	=	0.99	93		
Calibration	Accepted	=	Yes/ł	\o **		

* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL080 to HVS008 with respect to the update in quality management system.

Calibrated by Date Jackey MA 04-May-18 Checked by Date Pauline Wong 04-May-18



综合試驗 有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website; www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:	18CA0322 01			te No.: 18CA0322 01 Pa		Page	1	of	2
Item tested									
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Meter (Ty Larson Davis LxT1 0003737	/pe 1)		Microphone PCB 377B02 171529					
Item submitted by									
Customer Name: Address of Customer: Request No.: Date of receipt:	Lam Geotechnics Ltd. - 22-Mar-2018								
Date of test:	28-Mar-2018								
Reference equipment	used in the calibrati	on							
Description; Multi function sound calibrator Signal generator	Model: B&K 4226 DS 360	Serial No. 2288444 61227		Expiry Date: 08-Sep-2018 01-Apr-2018		Traceab CIGISME CEPREI	le to: C		
Ambient conditions									
Temperature:	21 ± 1 °C								

Test specifications

Relative humidity:

Air pressure:

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of +20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory:



50 ± 10 %

1005 ± 5 hPa





Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Date:

© Soils & Materials Engineering Co. Ltd.

Form No CARP152-1/Issue 1/Rev C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

· 港 黄 竹 坑 道 3 7 號 利 達 中 心 1 2 樓

12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



2

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0322 01

Page 2 of

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test	Culture	-	Expanded	Coverage
Test.	Sublest:	Status:	Uncertanity (dB)	Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	N/A	N/A	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Uncertanity (dB) Factor	Status	Subtest	Test:
0.3	Pass	Weighting A at 125 Hz Weighting A at 8000 Hz	Acoustic response
	Pass	Weighting A at 8000 Hz	

Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.



The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

C Soils & Materials Engineering Co. Ltd.

Form No CARP 152-2/Issue 1/Rev C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 港 黃 竹 坑 道 3 7 號 利 達 中 心 1 2 樓 香

12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:	18CA0213 02		Page	1	of	2
Item tested						
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Me B & K 2250 2701778 -	ter (Type 1)	Microphone B & K 4950 2755097		Preamp B & K ZC0032 19223 -	
Item submitted by						
Customer Name: Address of Customer: Request No.: Date of receipt:	Lam Geotechnic - 13-Feb-2018	s Limited.				
Date of test:	21-Feb-2018					
Reference equipment	used in the cali	bration				
Description: Multi function sound calibrator	Model: B&K 4225	Serial No. 2288444	Expiry Date: 08-Sep-2018		Traceab	le to: C

Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISME
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI
Ambient conditions				

Temperature:	20 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1000 ± 5 hPa

Test specifications

- 1. The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580; Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- 2. The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of +20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference 3. between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets

Approved Signatory: Fen Jun O

21-Feb-2018 Company Chop:



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Date:

C Soils & Materials Engineering Co. Ltd

Form No CARP152-Missue 1/Rev C/01/02/2007



综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道 37號利達中心12樓

12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website; www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0213 02

Page 2

2 of 2

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

			Expanded	Coverage
Test:	Subtest:	Status:	Uncertanity (dB)	Factor
Self-generated noise	А	Pass	0.3	
	с	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.



The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

C Soils & Material's Engineering Co. Ltd

Form No CARP152-2/Issue 1/Rev C/01/02/2007



综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:	18CA0309 01		Page	1	of	2
Item tested						
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Mete B & K 2250-L 2722310	er (Type 1)	Microphone B & K 4950 2698702		Preamp B & K ZC0032 13318	
Item submitted by						
Customer Name: Address of Customer: Request No.: Date of receipt:	Lam Geotechnics - - 09-Mar-2018	Ltd.				
Date of test:	10-Mar-2018					
Reference equipment	used in the calib	ration				
Description: Multi function sound calibrator Signal generator Signal generator	Model: B&K 4226 DS 360 DS 360	Serial No. 2288444 33873 61227	Expiry Date: 08-Sep-2018 25-Apr-2018 01-Apr-2018		Traceat CIGISME CEPREI CEPREI	ble to: C
Ambient conditions						
Temperature: Relative humidity: Air pressure:	21 ± 1 °C 50 ± 10 % 1000 ± 5 hPa					
Test specifications						

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Date: 12-Mar-2018 Company Chop:

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

© Soils & Materials Engineering Co. Ltd.

Form No CARP152-1/Issue 1/Rev C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港黄竹坑道37號利達中心12樓

12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



Causana

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0309 01

Page

2 of 2

Europedad

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

			Expanded	coverage
Test:	Subtest:	Status:	Uncertanity (dB)	Factor
Self-generated noise	A	Pass	0.3	
	с	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.



The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

© Soils & Materials Engineering Co. Ltd.

Form No CARP152-2/Issue 1/Rev C/01/02/2007



余字合試験有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.

E-mail: smec@cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Website: www.cigismec.com

Certificate No.:	18CA0413 02		Page	1	of	2
Item tested						
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Met B & K 2250-L 2722311	er (Type 1)	Microphone B & K 4950 2698703		Preamp B & K ZC0032 13321	
Item submitted by						
Customer Name: Address of Customer: Request No.: Date of receipt:	Lam Geotechnics - - 13-Apr-2018	s Ltd.				
Date of test:	18-Apr-2018					
Reference equipment	used in the calil	bration				
Description: Multi function sound calibrator Signal generator	Model: 8&K 4226 DS 360	Serial No. 2288444 33873	Expiry Date: 08-Sep-2018 25-Apr-2018		Traceab CIGISME CEPREI	le to: C

Ambient conditions

Temperature:	20 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1000 ± 5 hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

© Soits & Materials Engineering Co. Ltd.

Form No CARP152-1/Issue 1/Rev C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港首竹坑道37號利達中心12樓

12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong, E-mail: smec@cigismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0413 02

2 of 2

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Uncertanity (dB)	Coverage Factor
Self-generated noise	А	Pass	0.3	
	С	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.



The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

C Soils & Materials Engineering Co. Ltd

Form No.CARP152-2/Issue 1/Rev C/01/02/2007

Page





CERTIFICATE OF CALIBRATION

Certificate No.:	18CA0116 01		Page	1	of	2
Item tested						
Description: Manufacturer: Type/Model No. Serial/Equipment No.: Adaptors used:	Sound Level Me B & K 2250L 3002695	ter (Type 1)	Microphone B & K 4950 2940839 -		Preamp B & K ZC0032 18582	
Item submitted by						
Customer Name: Address of Customer: Request No.; Date of receipt:	Lam Geotechnic - - 16-Jan-2018	s Ltd.				
Date of test:	18-Jan-2018					
Reference equipment	used in the calil	bration				
Description: Multi function sound calibrator Signal generator Signal generator	Model: B&K 4226 DS 360 DS 360	Serial No. 2268444 33873 61227	Expiry Date: 08-Sep-2018 25-Apr-2018 01-Apr-2018		Traceable CIGISMEC CEPREI CEPREI	e to:
Ambient conditions						
Temperature: Relative humidity:	21 ± 1 °C 50 ± 10 %					

Test specifications

Air pressure:

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580. Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580; Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Feng Jun Qi

1005 ± 5 hPa

Actual Measurement data are documented on worksheets.

Approved Signatory:

18-Jan-2018 Company Chop:



Comments: The results reported in his certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Date:

O Solis & Materials Engineering Co., Ltd

Form No CARP152-1/Issue 1/Rev C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黃竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.

E-mail: smec@cigismec.com Website: www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



2

1200003-008009

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0116 01

Page of

1. **Electrical Tests**

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

			Expanded	Coverage
Test:	Subtest:	Status:	Uncertanity (dB)	Factor
Self-generated noise	A	Pass	0,3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range . Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

	4	- End -	1	
Calibrated by:	11	Checked by:	K	
Date:	Fung Chi Yip	Date:	Lam Tze Wai 18-Jan-2018	

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

C Soils & Materials Engineering Co.: Ltd.

Form No CARP152-2/Issue 1/Rev C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.

E-mail: smec@cigismec.com Website: www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:	17CA1110 02	Page:	1	of	2
Item tested					
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Acoustical Calibrator (Class 1) Rion Co., Ltd. NC-73 10707358				
Item submitted by					
Curstomer: Address of Customer: Request No.: Date of receipt:	Lam Geotechnics Ltd. - - 10-Nov-2017				

Date of test:

.....

14-Nov-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Tracophie to:
Lab standard microphone	B&K 4180	2341427	11-Apr. 2018	Fraceable to.
Preamplifier	B&K 2673	2239857	05-May 2018	CEPDEL
Measuring amplifier	B&K 2610	2346941	03-May-2010	CEPREI
Signal generator	DS 360	61227	01-Apr 2019	CEPREI
Digital multi-meter	34401A	U\$36087050	25-Apr-2018	CEPREI
Audio analyzer	8903B	G841300350	21-Apr 2018	CEPREI
Universal counter	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1010 ± 5 hPa

Test specifications

The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B 1. and the lab calibration procedure SMTP004-CA-156.

The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique. 2.

The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference 3. pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on page 2 of this certificate.

Huang Jia Min/Feng Jun Qi

15-Nov-2017 Company Chop:



Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Date:

@ Soils & Materials Engineering Co . Ltd

Approved Signatory:

Form No CARP156-1/Issue 1/Rev D/01/03/2007



综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑遠37號利達中心12樓

12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@clgismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No .:

17CA1110 02

Page: 2 of 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

Frequency Shown	Output Sound Pressure Level Setting	Measured Output Sound Pressure Level	Estimated Expanded Uncertainty
Hz	dB	dB	dB
1000	94.00	93.93	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz	STF = 0.008 dB
Estimated expanded uncertainty	0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz	Actual Frequency = 991.5 Hz	
Estimated expanded uncertainty	0.1 Hz	Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz	TND = 0.3 %
Estimated expanded uncertainty	0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

	7	- End -	1 1
Calibrated by:	A	Checked by:	1~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Date:	14-Nov-2017	Date:	5-Nov-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Co. Ltd.		Form No CARP156-2/Issue 1/Rev C/01/05/200/



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 港黄竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:	18CA0309 02	Page:	1	of	2
Item tested					
Description:	Acoustical Calibrator (Class 1)				
Manufacturer:	Larson Davis				
Type/Model No.:	CAL200				
Serial/Equipment No.:	13098				

13098

Item submitted by

Adaptors used:

Curstomer:	Lam Environmental Service Ltd
Address of Customer:	(A)
Request No.:	2
Date of receipt:	09-Mar-2018

Date of test:

12-Mar-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	11-Apr-2018	SCL
Preamplifier	B&K 2673	2239857	05-May-2018	CEPREI
Measuring amplifier	B&K 2610	2346941	03-May-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI
Digital multi-meter	34401A	US36087050	25-Apr-2018	CEPREI
Audio analyzer	8903B	GB41300350	21-Apr-2018	CEPREI
Universal counter	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1000 ± 5 hPa

Test specifications

- 1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156
- 2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 3. The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 50942, 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions

Details of the performed measurements are presented on page 2 of this certificate





12-Mar-2018



Comments: The results reported in this ceptificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long term stability of the instrument.

Date:

© Soils & Matenals Engineering Co., Ltd

Form No CARP156-1/Issue 1/Rev D/01/03/2007

Company Chop:



综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黃竹坑道 3 7號利達中心 1 2 樓

12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@clgismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0309 02

02

Page: 2 of 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

Frequency Output Sound Pressure Shown Level Setting Hz dB	Measured Output Sound Pressure Level dB	(Output level in dB re 20 µPa) Estimated Expanded Uncertainty dB	
1000	94.0	93.81	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz	STF = 0.011 dB
Estimated expanded uncertainty	0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz	Actual Frequency = 1000.0 Hz	
Estimated expanded uncertainty	0.1 Hz	Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz	TND = 0.6 %	
Estimated expanded uncertainty	0.7 %	

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

	1	- End -	1	
Calibrated by:	1~~(Checked by:	F	
Date:	Fung Chi Yip 12-Mar-2018	Date:	Lam Tze Wai 12-Mar-2018	

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

© Soils & Materials Engineering Co. Ltd.